233-X/005

M.C.A. EXAMINATION

May 2000

(Second Semester)

MCA-202

Database Management System

Time : 3 Hours *Maximum Marks : 100*

Note : Attempt *Five* questions in all, selecting at least two questions from each Unit.

Units I

1. (a) Discuss the main characteristics of the database approach and how it differs from traditional file system. 10

   (b) Give the capabilities that should be provided by a DBMS. 10

2. (a) Describe in detail the ANSI three-schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture? 12

   (b) What do you understand by 'data independence'? After explaining two types of it, differentiate

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them. 8

3 (a) Define the following terms with examples:

Interblock gap, indexing field, primary key field, clustering field, secondary key field, dense index and sparse index 8

(b) Explain the structure of B-tree and insertion operation on it with the help of an example. 12

4 Explain Relational and Network data models in terms of their concepts and constraints. 20

Unit II

5. What is relational algebra? Discuss and examplify various type of JOIN operations (with example) of Relational Algebra. Let the following relation scheme be given:

$$R = (A, B, C)$$

$$S = (D, E, F)$$

Let relation r (R) and s (S) be given. Give an expression in the tuple and domain calculus that is equivalent to each of the following:

(i) $\Pi_A (r)$

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(ii) $\sigma_B = 17\ (r)$

(iii) $r \times s$

(iv) $\Pi_{A,F}(\sigma_{C,D}(r \times s))$ 20

6. How is the concept of functional dependency useful in database design process? After explaining the need and concept of Normalization of databases, give the detail of normalization procedure based upon the concept of functional dependeney. 20

7 (a) What is concurrency in databases? What different problems can occur if it is not controlled? Give one scheme for controlling concurrency based upon time stamp. 10

(b) Discuss the different types of transaction failures. Also discuss two log-based recovery schemes and differentiate them. 10

8. Write notes on the following :

(a) Minimality for set of functional dependencies 5

(b) Data Security 5

(c) Distributed DBMS. 10

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